THE

AGRICULTURAL BULLETIN

OF THE

FEDERATED MALAY STATES.

No. 8.] MARCH, 1914. [Vol. II.

MR. L. C. BROWN.

On January 31st, 1914, Mr. L. C. Brown, Inspector of Coconuts in the Department of Agriculture, F. M. S., retired from Government service. Mr. Brown was appointed Federal Inspector of Coconuts in 1902, a post for which his long acquaintance with Malayan agriculture and agriculturists well qualified him. The formation of a Department of Agriculture, F. M. S., did not take place until 1905, and Mr. Brown's inspection division was afterwards incorporated in the Department. At the close of his service he was assisted by two Assistant Inspectors and nineteen Sub-Inspectors.

Very few people have been long enough in the country to realize from personal experience and observation the value of Mr. Brown's services to coconut cultivation. When he started his work coconut pests were increasing to an alarming extent and it was difficult to find a native holding free from them, and very little attention was paid to their control; European planters were naturally alarmed at the spread of the pests and were put to considerable trouble and expense in keeping their own places free. Now it can, I think, be said that Coconuts in Malaya are remarkably free from pests and when these do occur, their treatment is taken in hand at once.

The methods by which Mr. Brown has brought about this change are well stated in a letter dated October 7th, 1902, addressed to the Chairman, United Planters' Association. " I would ask your Association kindly to co-operate with me in the work and assist me in making the best progress possible. In the coconut plantations, and this applies more particularly to native holdings where the ravages of the beetles are worst, it will I fear be necessary to take very stringent measures, but I would prefer using most pressure by persuasive means, pointing out to owners and tenants alike how much it is to their own advantage if they will themselves help in getting rid of these pests."

The report of the United Planters' Association for 1903 states that already " on all sides it is admitted that an immense amount of good has been done by the Department which has been entrusted with the working of the ordinance for the protection of Coconut trees. It has no doubt been a comparatively easy matter for the Inspector to see that European Estates are kept in order, but this cannot have been the case with native cultivations. An immense area has to be traversed and carefully inspected, and the often careless and lazy owners persuaded that it is to their best advantage that their trees should be not only cleared but kept clear of the destructive insects, whose presence spells ruin not only to themselves but to their neighbours. With what success this arduous undertaking has been attended can be seen in almost every quarter.....the Government have every reason to feel proud of the results of their timely action in the matter."

That this good start has been thoroughly well maintained will be agreed to by all interested in Coconut planting in the Federated Malay States.

Apart from his inspection work Mr. Brown's knowledge of Coconuts and their cultivation have been freely at the disposal of all those who have been interested. His Bulletin, No. 11, on" Coconut Cultivation" has been and is always in great demand. It is interesting to note that while in 1903, Mr. Brown estimated the total acreage under Coconuts in the Federated Malay States at 77,500, in 1912 his figure is approximately 157,600 acres, more than double, in spite of the effects of the "rubber boom."

Not only with regard to Coconuts, but in many other branches of Agriculture, Mr. Brown has acquired an immense fund of knowledge, which was of the greatest value to the Department of Agriculture and to planters generally. If ever an out-of-the-way subject came up for enquiry, Mr. Brown was always applied to and usually had valuable information to impart.

Mr. Brown's colleagues and friends in the Department of Agriculture and among the planters of Malaya view with great regret his resignation. They trust, however, that he will be among us for many years, giving us the benefits of his wide experience and knowledge.

L. LEWTON-BRAIN.

THOROUGH DRAINAGE AND THE PREVENTION OF MALARIA.

BY FRANK D. EVANS, A. M. INST. C. E.

Executive Engineer, Malaria Advisory Board, F. M. S.

The influence of drainage and cultivation on malaria was noticed before Ross definitely showed the part taken in its transmission by the anopheline mosquitoes, but the question was confus-

ed by the amount of sickness which invariably occurred when drainage and cultivation or works involving heavy earthwork were undertaken, and it was not until after Ross made his discovery that logical conclusions could be formed from the large amount of information available on the subject. Since that time many measures directed against the mosquito have been tried and one of these, thorough drainage, it is proposed to consider in this short paper, with special reference to its use on estates in the Malay States.

Thorough drainage, or to give it an appropriate title much used in this country, anti-malarial drainage, may be taken to imply the drainage of land in such a manner that no wet ground, swamps nor pools remain after drainage, and that the drainage water flows freely in the channels provided.

Flat land and swamp drainage present no technical difficulties as a rule unless the ground it is desired to drain be subject to tidal inundation, and experience has demonstrated that clearing and draining over a sufficient area on the flat land near the coast will completely eradicate malaria. Fortunately on that land good drainage is essential for agricultural development and happens to coincide with the measure best calculated to abolish malaria. In addition the character of the peaty soils usually found on the coast land seems to be unfavourable to the development of many varieties of anopheline mosquitoes, although the information available is not sufficient to justify more than a general statement on this point.

Hill land on the other hand presented a great many difficulties, but three years ago despite many efforts made, the thorough drainage of hill land was an unsolved problem. The problem has been completely solved (1) and it is now economically practicable to apply thorough drainage to any type of land with certainty of success.

What is required of drainage as an anti-malarial measure? Water is a necessity for propagation of mosquitoes, but all varieties of mosquitoes will not develop in any kind of water. Mosquitoes do not breed in running water moving with a fair velocity, as their larvæ do not obtain food in such water. Moreover for some days in the life of a mosquito, the egg stage and to a less degree the pupa stage, it is quite at the mercy of the flowing water and would be carried many miles away from the place where the egg was deposited, so that if a stream can be imagined flowing from hills to sea with no obstruction, and mosquitoes by some chance in existence along it, time only would be necessary to effect the complete disappearance of mosquitoes owing to their gradual transference towards the sea. The essential for anti-malarial drainage is therefore that all water shall flow with a fair velocity in channels free from obstructions.

(1) The anti-malarial drainage work carried out by Government at Kuala Lumpur is here referred to.

In hill land open earth drains cannot as a rule satisfy this condition owing to the pools and wet ground which form in them and along their sides, and the influx of matter which impedes the flow of water, all consequent on the violent conditions to which the drains are subjected to during rain, and the steep slope to which it is necessary to form drains in ravines. The problem of anti-malarial drainage is therefore not to cause water to flow out of sight but to cause it to move in such a manner that it does no damage to its channels and that no pools nor wet ground are left, and also to arrange that it shall not be easy for such channels to become blocked in any way, and when this occurs that the channels shall be immediately cleared. It was not necessary to go outside available methods to provide a solution for the difficulties mentioned in the last paragraph. They are got over largely by the use of sub-soil pipe drains similar to those used for agricultural drainage elsewhere, and the principles now followed in ravine drainage are those formulated early in the eighteenth century by Elkington, an English Agriculturalist. But for the sanctity which seems to have surrounded them it would hardly seem necessary to state that earthenware pipes have no anti-malarial properties in themselves, they only provide an inexpensive channel in which to run small streams of water, and the effect of their use in the reduction of malaria does not depend only on their application but on the method and skill with which they are used. It seems almost ridiculous to labour this point, but common conversation on the subject leads one to believe that it is often lost sight of. Any method of laying pipes for drainage will not necessarily give the required results.

The problem of anti-malarial drainage as applied to hill land is that given in detail above with the additional difficulties experienced in keeping the drainage system in the required order. It is of little use to provide adequate drainage if frequent storms can wreck the system, as has happened constantly in many places. As stated this particular problem was solved in Kuala Lumpur, and it has there been demonstrated on an extensive scale that thorough drainage on hill land can be carried out in an economical and satisfactory manner, with the certainty that almost no further expenditure other than that required for the purpose of keeping grass cut short over the drained area will be needed, provided that the work is well done under the close supervision of those having the necessary experience.(2) The results obtained in Kuala Lumpur are most satisfactory

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(2) The Malaria Advisory Board intended that the work in Kuala Lumpur which includes work on the Government Plantation, should serve as an example to those interested, and the Executive staff to the Board will take any such persons over the work.

and demonstrate in a striking manner the advantage of anti-malarial drainage properly executed. Unfortunately the results are still affected by the continued existence of swamps known to favour the breeding of anopheline mosquitoes, and what malarial sickness remains in the Town is largely due to these swamps. Also although almost the whole of the hill area has been drained there still remains a section of the Town consisting of flat land where work is now in progress.

The table below gives the true total death rate and the malarial death rate of the Town for each year since 1907.

	1907.	1908.	1909.	1910.	1911.	1912.	1913.
True death rate per 1000.	37.9	43 7	32.3	30.3	39.4	36.7	35.5
Malarial death rate per 1000	9.7	10.7	7.7	9.8	9.9	5.8	4.2

It was at the end of 1911 that the work done was first completed thoroughly enough to affect considerably the health of the population of the area drained, and all work done since has been equally thorough. The results are evident from an inspection of the table. Malaria does not prove fatal as a rule except after many attacks and the reduction in the malarial death rate means an enormous reduction in malarial sickness. Malaria can and will be practically eradicated from Kuala Lumpur.

Further interesting figures are available from the health returns of the Police Depôt, Kuala Lumpur, for the years 1910 to 1913 inclusive, and the table below gives the average percentage of Indian recruits at the Depôt who were detained in hospital or given sick leave for malaria monthly :—

	1910.	1911.	1912.	1913.
Average monthly percentage.	35.75	57.01	27.33	11.3.

The protective works were practically completed early in 1912 except for the continued existence of one of the swamps mentioned above which still affects the health of the Depôt and the Town in the neighbourhood, and further great improvement will take place when anophelines no longer breed in it.

The monthly percentages given above mean that in 1911, to take the worst case, every Indian at the Depôt was in hospital or given sick leave for malaria on an average 7 times in the year. Very few places can show a sickness rate to compare with this, and when it is stated that the men are picked healthy Sikhs and Pathans of a fairly high physical standard it will be realised what the condition of the labour force having a poor physical standard would have been under the circumstances. It may be mentioned that the improvement was obtained notwithstanding the large increase in the population at the Depôt subsequent to 1911 when a considerable number of the men were unprotected by mosquito

nets at night. An increase in the density of a population is invariably associated with a more rapid increase in the Malarial sickness rate. Quinine has only been given to the men under hospital treatment or to those who cared to ask for it.

Amongst the Government Officers and their servants who live in the drained area to the west of the railway few cases of malaria have occurred since the beginning of 1912, and none of these have been reported by the Medical Authorities as having been infected or re-infected in the area itself. That the improvement in the malarious condition of Kuala Lumpur has been due to the works undertaken is proved by the fact that malaria persists in the neighbourhood of the swamps already referred to, and also on the limits of the drained area. Several new bungalows on the Experimental Plantation were occupied early in 1913 and nearly all the occupants suffered severely from malaria. Since the middle of the year when drainage work in the neighbourhood, commenced in January, afforded definite protection no new cases have occurred. Temporary lines were built for 200 Tamil coolies on the western limit of the drained area early in 1913. The Tamil coolies, who had not had malaria for the previous year or two, were attacked so severely that they had to be removed elsewhere. An attempt to house Chinese coolies in the lines had similar results and the lines have been abandoned. Estate coolies living in lines to the south of the drained area suffered severely from malaria during 1913 and the Estate Authorities are now carrying out a thorough drainage scheme to protect them.

While the experience and results obtained from the work in Kuala Lumpur are very convincing there is a feeling in existence that the conditions in the Town are perhaps in some way different from those which obtain on estates, and under any circumstances the results got from extensive work over a large area such as Kuala Lumpur is not strictly comparable with work which would need to be done on an estate in order to protect an estate population. This is to some extent no doubt true, but a demonstration now about to be carried out on a very malarious estate in Negri-Sembilan (3) will shortly provide information on the required lines. Much anti-malarial drainage has already been put in on estates in the Malay States, and on many recently protected and where work is in progress, the methods and manner in which the work has been done leave no doubt as to the results, which are already evident.

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(3) Government are about to thoroughly drain an area covering a distance of ½ mile from a central line site on Terentang Estate, Negri Sembilan, to demonstrate the advantages of Anti-Malarial Drainage properly carried out. The results will be made public periodically.

Whatever arguments are put forward for the good to be derived from any particular measures affecting health they are not likely to be productive of action on the lines advocated unless it can be shown conclusively that such measures will result in an increased return from labour to those who undertake them, and an attempt will be made to show that anti-malarial drainage will result in economy on malarious estates in hill land.

First as to the original cost, it may be accepted that any hill land unless it possesses quite exceptional features can be thoroughly drained at a cost *not exceeding* $36 per acre of gross area drained. It is at present considered necessary to drain thoroughly all land within a distance of ½ mile of the coolie population, although a less distance will give adequate protection to an ordinary bungalow. From this rate per acre the maximum cost of anti-malarial drainage work necessary on any estate can easily be obtained (4) and to this must be added any special expenditure which may be necessary to bring buildings within one sanitary area. The cost of maintenance may be accepted as 10 per cent. of the original cost in the year following construction and 5 per cent. in subsequent years. These are the maximum normal figures, but it must be remembered that undesirable saving of expenditure on construction will most certainly result in heavier charges for maintenance.

Against the expenditure on thorough drainage has to be set the greater working capacity of the labour force, the greater efficiency of the labour force consequent on better management resulting from the more active supervision on the part of a healthy manager and assistants, reduction in recruiting expenses due to improved health of estate, and reduction in medical administration expenses.

The greater working capacity and efficiency of the labour force following improved health conditions will usually be the most important. The difference between the cost of output of a well and badly managed labour force can easily amount to 50 per cent. or more, especially when the force works for day wages. On a malarious estate in Selangor having a manager and six assistants there have been occasions when only one has not been confined to his quarters with malaria. Efficient management is impossible under such conditions.

From the foregoing and the knowledge of the facts affecting any particular estates, those interested can form an approximate estimate of the cost of thorough drainage and the probable economy which will result from it.

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(4) The executive staff of the Malaria Advisory Board will if requested advise estate managers as to the work required and its probable cost.

THE AGRICULTURAL PESTS ENACTMENT NO. 13 OF 1913.

By F. W. South.

Introduction.

Public opinion in the British Colonies and Protectorates has for more than 10 years been alive to the desirability of legislative control to regulate the importation from outside countries of plants that might serve as carriers of pests and diseases previously unknown. Only recently, however, has the same desirability been recognised for the provision of legislation to control such plant pests and diseases as are already known to exist within certain Colonies and Protectorates. In 1907 the Governor of Ceylon with the consent of the Legislative Council passed an Act to provide for the destruction of plant pests and for the sanitation of plants in that Colony; in 1912 an Enactment with a similar object came into force in Trinidad. In the Federated Malay States an Enactment was passed by the Federal Council and published in the Government Gazette of August 1st, 1913, to provide for the Protection of Trees, Plants and Cultivated Products from Disease and Pests; it makes rules for the control of pests and diseases that already exist or may arise in this country and also gives power to the Chief Secretary to make such rules as he considers necessary to regulate the importation of plants likely to introduce pests or diseases from other countries. Previous to this the only legislation of the same nature in this country was in the form of the Coconut Trees Preservation Enactments of 1898 which provided regulations for the control of two serious coconut pests, the Rhinoceros and red beetles. These were repealed by the present Enactment as their main provisions are embodied in it.

The advisability, or rather the necessity for the existence of the new Enactment becomes obvious when it is considered that by far the greater portion of the cultivated area in this country is planted with one permanent crop only and that very large sums of capital are invested in it. If any epidemic were to destroy this crop entirely, the financial loss would be enormous; there would be nothing to fall back on as there is no secondary crop occupying any wide area at present with the exception of padi which is entirely in the hands of the Malays; while the area under coconut estates represents an almost negligible fraction of that under rubber estates. In view of this it is clearly necessary that every possible precaution should be taken to protect the rubber cultivations from any possible epidemic of disease.

The main sources of danger to any cultivated crop are shortly as follows: Circumstances, such as weather conditions, may for a period greatly favour the growth and increase of some pest or

disease long known to exist to a limited extent, so that it rapidly develops, if untreated, into an epidemic.

Some insect or fungus, previously confined to other hosts either cultivated or wild may become adapted to the crop and then spread with extraordinary rapidity. If such a pest or disease is known on its original host measures may be available for its control. In this country, however, there are enormous tracts of jungle surrounding the groups of estates and from these an unknown insect or fungus might spread to rubber. Before such could be properly controlled it would be necessary to study their life histories, so that it is important that they should be discovered as soon as possible and fully investigated before they obtain a firm hold or reach epidemic proportions.

Finally there is the danger from the introduction by way of plants imported from outside of some pest or disease not previously known, but capable of spreading very fast through large areas occupied by a congenial host plant.

A very serious contributory factor to the danger of some pest or disease developing as an epidemic in this country is the presence among the large estates of a great number of small native holdings. These are often planted with rubber and in many cases are badly neglected so that the rubber is of poor growth and even if fairly free from disease is sickly and in a condition to succumb at once to any attack. Treatment of diseases or pests in these holdings is hardly ever practised, unless insisted upon, and in consequence they form a ready source of reinfection for neighbouring estates where usually much care is devoted to the control of pests and diseases. No effective control could be exercised over the increase of any ailment of rubber unless concerted action could be relied upon such as would include the small holdings also.

It is the object of the Agricultural Pests Enactment to minimise these various sources of danger to cultivated plants, and especially to rubber, by creating a staff of trained Inspectors provided with adequate powers to deal with the situation. These Inspectors form part of the establishment of the Agricultural Department and are under the control of the Director. They will endeavour to control the danger to cultivated plants from pests and diseases by work along the following lines. Firstly they will be at liberty to give information regarding the nature and treatment of any known pest to any one applying to them for assistance, the advice as to treatment will be along the lines recommended by the Mycologist and the Entomologist to the Agricultural Department. Secondly they will endeavour to pay periodical visits to every estate in the country and to the majority of small holdings so that if any new disease appears from the jungle they may become aware of it and report

it to the Mycologist or Entomologist for investigation immediately, thus enabling it to be dealt with before it becomes wide spread, These visits of inspection will also serve to show what estates and small holdings are in an insanitary condition or contain any known pest or disease which is not receiving treatment, in consequence of which these holdings or estates constitute sources of danger to their neighbours. By virtue of the powers conferred on them by the Act the Inspectors can require the owners or occupiers of insanitary cultivated areas or crops to take such steps to render their land or crops sanitary as the Inspectors may require. If the owners or occupiers fail to do this the Inspectors can cause the measures to be taken and then the Director of Agriculture can recover the cost by a civil suit subject to certain restrictions which will appear later. Criminal actions involving a maximum fine of $500 can also be instituted against such defaulters. Thus adequate means are provided for ensuring that all owners or occupiers of cultivated land, shall keep their land in such a condition as shall prevent it from serving as a source of danger to neighbours. As has already been stated, the danger due to the possible introduction of pests and diseases from outside countries is to be met by special rules laid down from time to time by the Chief Secretary regarding the importation of plants, since the Enactment gives him power to make such rules at his discretion.

It may be pointed out here that the Inspecting Staff is not intended to carry on any original investigations or to devise experimental treatment. It will merely report any suspected new pest or disease to the Entomologist or Mycologist and act on their recommendations as regards treatment. It may also be pointed out that the Staff hope to be able, as a result of their contact with the natives, to develop among them a knowledge of the elementary principles of good agriculture and to give them friendly advice which will gradually lead to a generally improved condition of their holdings and result in a higher standard of sanitation being maintained on these.

The Enactment:—Title and Definitions.

Sections 1 and 2 of the Agricultural Pests Enactment No. 13 of 1913 deal with the title and with definitions. In this connection attention may be called to the definition of the term "pest" in Section 2, subsection (vi), which runs as follows: "Pest" includes every insect, invertebrate animal, rodent, plant and fungus which is destructive or injurious, or apt to be destructive or injurious, to cultivated plants. This is a wide definition and includes rats and squirrels among rodents and lalang or any other harmful weed among plants.

These can be dealt with in accordance with the terms of the Enactment so long as they occur on cultivated land. The term "plant" is also given a wide definition to include any tree, shrub or vegetation, whether living or dead, and includes the stem, root, leaf, flower or fruit and any product or part thereof whatsoever, whether severed or attached.

Staff.

Section 3 deals with the appointment of the staff necessary to carry out the terms of the Enactment. The Chief Secretary may from time to time appoint as many Inspecting Officers as he thinks fit and may limit the areas within which any or all of them shall exercise their powers and perform their duties (Subsections i and ii). In accordance with subsection iii an Inspecting officer may with the written approval of the Director of Agriculture delegate by writing to an officer subordinate to him any powers or duties assigned to an Inspecting Officer by the Enactment.

In accordance with this section the following staff were appointed as Inspectors by the Chief Secretary by notification in the Government Gazette of September 12, 1913.

Mr. L. C. Brown, Inspector of Coconuts, F.M.S. Mr. F. W. South, Chief Agricultural Inspector.	Throughout the Federated Malay States.
Mr. A. G. G. Ellis, Assistant Agricultural Inspector Mr. D. G. Deeble, Assistant Inspector of Coconuts	For the State of Perak.
Mr. F. de la Mare Norris, Assistant Agricultural Inspector	For the State of Selangor.
Mr. P. B. Richards, Assistant Agricultural Inspector	For the States of the Negri Sembilan and Pahang.
Mr. T. C. Nock, Assistant Inspector of Coconuts	For the States of Selangor and the Negri Sembilan.

and by notification in the Gazette of February 27, 1014

Mr. H. H. Stirrup, Assistant Agricultural Inspector, Perak South.	For the State of Perak.

Mr. L. C. Brown retired at the end of last year. On the arrival of Mr. Stirrup the work in Perak was divided between Mr. Ellis and Mr. Stirrup, the former being stationed at Taiping and having charge of the work in Perak North comprising the districts of Kuala Kangsar, Larut, Matang, Selama, Krian and Upper Perak, and the latter being responsible for Perak South including the districts of Kinta, Batang Padang and Lower Perak, with his head-quarters at Batu Gajah. Mr. Deeble is also stationed at Batu Gajah and at present will assist Mr. Stirrup with his duties. Mr. South, Mr. Norris, and Mr. Nock are stationed in Kuala Lumpur, and divide the duties in

Selangor, the last mentioned having charge more especially of the section of the work relating to coconuts. Mr. Richards' head-quarters are at Seremban. The work in Pahang will be carried out by Mr. Richards or the Chief Agricultural Inspector according to convenience.

Under Subsection iii of this section the staff of Sub-Inspectors of Coconuts have been appointed Inspectors under the Enactment by the Chief Agricultural Inspector with the written approval of the Director of Agriculture. Their powers are limited to the districts to which they are appointed. Of these, 4 are stationed in Perak North under the control of the Assistant Agricultural Inspector, Perak North, 3 in Perak South under the control of the Assistant Agricultural Inspector, 4 in Selangor in charge of the Assistant Inspector of Coconuts, 4 in the Negri Sembilan in charge of the Assistant Agricultural Inspector, and 4 in Pahang in charge of the Assistant Inspector of Coconuts, Mr. Nock. The organisation of the whole staff is in the hands of the Chief Agricultural Inspector now that the Inspector of Coconuts has retired.

If the need should arise other Government Officers such as District Officers and Assistant District Officers can be given powers as Inspectors under the Enactment. Similar powers can also be given to the Malay Assistants of whom one is attached to each of the Agricultural Inspectors.

Supervising Committee.

Section 4 deals with the constitution of a supervising Committee to act, as it were as a court of appeal. Any owner or occupier who objects to the instructions given him in a notice served by an Inspector may in accordance with Section 7 appeal to this Committee for their cancellation or modification on the grounds that the instructions are unreasonable or unnecessary and the Committee may then take such action as it thinks fit. This Committee is to consist of the Director of Agriculture, as Chairman, and not less than two other persons nominated by the Chief Secretary, and of these not more than one-half are to be officers employed in the public service. Such a Committee has already been appointed.

The considerations rendering an Enactment of this nature advisable its title, definitions and the composition of the necessary staff have now been dealt with. The actual method of procedure laid down by it for dealing with insanitary cultivated land and with crops attacked by pests or disease, as well as the remaining provisions of the Enactment will be dealt with in the next number of the *Agricultural Bulletin.*

(to be continued)

INTERNATIONAL RUBBER CONGRESS, BATAVIA.

We have pleasure in publishing the following preliminary programme of the congress which is to be held in connection with the International Rubber Exhibition at Batavia in September this year.

It has been decided that the Federated Malay States Government and the Planters' Association of Malaya shall be officially represented, and it is hoped that many planters and others interested in rubber from Malaya will also attend. The Hon. Secretary to the Malayan Committee, Mr. W. E. van Rynberk, Singapore, asks all those who propose to attend to send their names to him as soon as possible. Special congress tickets are issued at a cost of $7.00, entitling the holder to reduced railway fares in this country and Java, special steamer fares, etc.

Sunday, September 6.

Arrival of Dutch mailboat from Europe *via* Colombo and special Congress Steamers from Deli and from Port Swettenham and Singapore.

Monday, September 7.

(1) *Address* by Prof. F. A. F. C. Went, of Utrecht University on "Science and Tropical Cultivation."

(2) *Address* by Henry C. Pearson, New York, on "What Manufacturers desire in Crude Rubber."

Tuesday, September 8.

(1) *Address* by Prof. Erwin Baur, of Berlin University on: "Die Fortschritte der Vererbungsforschung und Ihre Bedeutung für die Züchtung tropischer Kulturpflanzen, besonders der Kautschukpflanzen."

(2) *Discussion* on "Selection of Hevea."
Introductory paper by:
Dr. P. J. S. Cramer, Buitenzorg, Java.

(3) *Discussion* on "Diseases and Pests of Hevea."
Introductory papers by:
Dr. C. J. J. van Hall, Buitenzorg, Java.
Dr. A. A. L. Rutgers, Buitenzorg, Java.

Wednesday, September 9.

(1) *Address* by Dr. Schüffner, of the Medical Institute, Medan, Deli, on: "Hygienic Measures."

(2) *Discussion* on "Catch-crops and Intercrops."
Introductory papers by:
Dr. Th. Wurth and Dr. P. Arens, Malang, Java.

Dr. C. J. J. van Hall, Buitenzorg, Java.
Dr. J. W. Gallagher, Deli, Sumatra.
Mr. R. W. Munro, Morib, Selangor, F. M. S.

(3) *Discussion* on "Planting distances and thinning out."
Introductory papers by:
C. M. Hamaker, Kiara Pajoeng, Java.
The Hon: Mr. E. B. Skinner, Kuala Lumpur, F. M. S.
.....Ceylon.

(4) *Discussion* on "Artificial Fertilisers" and "Green Manures" for Hevea.
Introductory papers by:
Dr. A. W. K. de Jong, Buitenzorg, Java.
Mr. Calland, Kalthur, Ceylon.*
Mr. M. Barrowcliff, F. I. C., F. C. S., Kuala Lumpur, F. M. S.
Mr. F. G. Spring, N. D. A., U. D. A., Kuala Lumpur, F. M. S.

Thursday, September 10.

(1) *Discussion* on "Tapping and Tapping Systems."
Introductory papers by:
Dr. A. W. K. de Jong, Buitenzorg, Java.
Mr. F. G. Spring, N. D. A., U. D. A., Kuala Lumpur, F. M. S.

(2) *Discussion* on "Preparation of Rubber."
Introductory papers by:
Dr. A. J. Ultée, Djember, Java.
Mr. B. J. Eaton, F. I. C., F. C. S., Kuala Lumpur, F. M. S.
Mr. Stafford Whitby, Kajang, F. M. S.
Mr. Sydney Morgan. F. M. S.*

(*Evening.*)

Address on the "Collection of Rubber in Brazil" by Dr. P. J. S. Cramer, Buitenzorg, Java.

Friday, September 11.

(1) *Discussion* on the "Reduction of Cost Price of Rubber."
How to realise it?
Introductory papers by:
Mr. E. A. O. Vervooren, Bandoeng, Java.
..... Ceylon.
Mr. E. Macfadyen, F. M. S.

(2) *Demonstration* of the "Scientific methods of Rubber testing' on the Exhibition grounds by:
Mr. B. J. Eaton, F. I. C., F. C. S., Kuala Lumpur, F. M. S.
Prof. G. van Iterson and J. G. Fol, Delft, Holland.

Saturday, September 12.

(1) *Address* by Mr. J. G. Fol, Delft, Holland, on "The Results on Scientific Testing of the Empirical Appreciation of Raw Rubber."

(2) *Discussion* on "Methods of Testing Raw Rubber."

Introductory papers by:

Mr. J. G. Fol, Delft, Holland.

Mr. B. J. Eaton, F. I. C., F. C. S., Kuala Lumpur, F. M. S.

Dr. W. R. Tromp de Haas, Buitenzorg, Java.

**Invited.*

Buitenzorg, January 22, 1914.

The 2nd Secretary of the Congress-Committee.

DR. A. A. L. RUTGERS.

REPORT BY THE IMPERIAL INSTITUTE, LONDON, ON A SAMPLE OF FIBRE PREPARED GROWN AT THE EXPERIMENTAL PLANTATION, KUALA LUMPUR.

Introductory Note.

BY F. G. SPRING.

At the request of the Director of Agriculture, F. M. S., a sample of fibre was prepared from plants grown at the Experimental Plantation, Kuala Lumpur, and forwarded to the Director, Imperial Institute, London, to be examined and valued and to have its tensile strength, in particular, determined.

The method in which the fibre was obtained is as follows:—

The lower, thick, green, fleshy leaves were cut by means of an ordinary pruning knife at an early hour in the morning and made into bundles of about thirty leaves to a bundle, each of which was immersed in a more or less stagnant pool of water the same morning. The leaves were kept under the surface of the water by means of wooden posts placed on top of them. The duration of immersion was 14 days, at the close of this period the bundles were removed, untied, washed in fresh water, and the individual leaves were put through ordinary rubber factory rollers; this removed a large amount of the soft fleshy pulp. At this stage the fibre was well washed in running water, afterwards being placed on boards and beaten with sticks; this removed an additional quantity of pulp.

The combing or scraping was done between blunt pieces of iron, small quantities being subjected to this treatment at a time, each individual strand of fibre being afterwards pulled through the coolies' hands to remove any remaining impurity. The fibre was then soaked in clean water for about one hour and afterwards hung up to dry, first in the shade and later in the sun.

This process is undoubtedly a laborious one and in order to extract the fibre in an effective and economical manner an order was placed last year by the Federated Malay States Government for some modern fibre machinery. This has now being received by the Agricultural Department, Kuala Lumpur, and it is hoped that in the near future results of considerable interest, in connection with various fibre producing plants, may be obtained.

It is doubtful if the sample forwarded as Sisal hemp to the Imperial Institute is true sisal (Agave rigida var. sisalana). Bulbils of the true sisal hemp have been received from Manila.

It might also be added that several other varieties of fibre producing plants are being cultivated at the Government Plantations for the purpose of experimental work, such as Manila hemp, Sansevieria spp,, etc.

With regard to the report from the Imperial Institute it is gratifying to note that fibre similar to the sample forwarded would be saleable in large quantities for cordage manufacture, and that a more valuable product could probably be obtained by the use of modern machinery.

Imperial Institute Report.

Description of Sample.

The sample consisted of ¾ lb. of lustrous fibre, fairly well cleaned and prepared, but of slightly uneven colour, varying from cream to brownish-yellow, and generally considerably darker in tint than is usually the case with Sisal hemp. The length of staple varied from 2 feet 8 inches to 6 feet, with an average of 4 feet 3 inches.

Result of Examination.

(1) The fibre was submitted to chemical examination with the following results, compared with corresponding figures for a sample of Sisal hemp from the East Africa Protectorate.

	Present Sample.	Sisal hemp from the East Africa. Protectorate
	Per cent.	Per cent.
Moisture	12.0	11.1
Ash	0.8	1.0

	Present Sample.	Sisal hemp from the East Africa. Protectorate
	Per cent.	Per cent.
a-Hydrolysis, loss	11.3	11.2
b-Hydrolysis, loss	20.1	14.1
Acid purification, loss	1.9	2.3
Cellulose	77.1	78.2

The length of the ultimate fibres varied from 0.06 to 0.29 inch, with an average of 0.19 inch.

The dark colour of the fibre as received at the Imperial Institute was found to be due to the presence of iron, which may have been derived either from the water used in washing or from the scraping instruments used in preparing the fibre. After removing this iron by the use of chemicals, the washed and dried fibre was of a light cream colour.

(2)) The fibre was examined for tensile strength and elongation in comparison with a standard sample of Sisal hemp from East Africa. Using a length 20 cms. of fibre for the tests, the following average results were obtained :—

	Present Sample.	Sisal hemp from East Africa.
Breaking stress in gram.	618	1102
Extension before breaking per cent.	4.5	2.0

Taking the East African Sisal hemp as the standard, the ratios are as follows ;—

	Present Sample.	Sisal hemp from East Africa.
Breaking stress	56	100
Extension	225	100

The above figures indicate that the present sample has only 56 per cent. of the strength of the East African Sisal hemp but it is 2¼ times as extensible as the latter.

Commercial Valuation.

The fibre was submitted to a firm of merchants, who valued it at £ 25 per ton in London, with Mexican Sisal at £ 26 per ton (December, 1913).

Remarks.

Fibre of this quality would be saleable in large quantities for cordage manufacture. A more valuable product could probably be obtained by extracting the leaves with modern machinery and brushing the fibre produced.

THE UTILISATION OF PARA RUBBER SEED.

An interesting article on the utilisation of Para Rubber seed appears in the latest *Bulletin of the Imperial Institute* from which this abstract has been prepared.

Samples of the seed were distributed to various firms for technical trial, and samples of the cake, after expressing the oil, were sent to the South Eastern Agricultural College, Wye, for feeding trials. The results of these trials may be summarised as follows :—

Para Rubber Seed Oil.

Paint and Varnish Manufacture:—One of the principal uses to which the oil may be put, is the manufacture of paints and varnishes, since it belongs to the class of oils known as drying oils and closely resembles linseed oil for which it forms a good substitute for the above purposes.

The opinions expressed by manufacturers to whom the samples were sent for trial, indicate, that unless the oil could be obtained at a fairly reasonable price compared with linseed oil, it would not be able to compete with the latter.

Linoleum manufacture :—Several trials were made with the oil for this purpose and the general opinion was that it was not very suitable for linoleum manufacture and could not be used as a substitute for linseed oil, unless the price was very low.

Soap Manufacture:—One firm of oil crushers were of opinion that it would be equal in value to linseed or cotton seed oil for the manufacture of soft soap.

Conclusions.

The opinion is expressed that there would be no difficulty in finding a suitable market for the oil, not only as a substitute for linseed oil, when the latter was high in price, but also for purposes for which linseed oil was unsuitable.

The problem of utilising the oil is concerned principally with the cost of manufacture of the oil and the quantities available.

In view of the new processes recently patented for the "hardening" of liquid oils by hydrogenation, a new market may be found for oils of this type, *e.g.* in candle making or even for edible purposes.

Para Rubber Seed Cake.

Feeding trials:—The first consignment of cake from Rangoon, which was used in the feeding trials, was abnormal, since it contained about 18 per cent. of fat, whereas not more than 6 to 9 per cent. would be normally present in the cake from well-expressed seeds.

In the second series of experiments a cake of more normal composition was used.

In the first trials, which were on a small scale only, the cake was fed to cows; most of them ate the cake readily after it was moistened with water. (N. B. It is dry and powdery in the natural state.) No abnormal results were obtained.

Similar results were obtained in the case of sheep which did not like the cake when fed alone, but ate it when mixed with other foods.

In the second series, 1½ tons of cake made from kernels obtained from Ceylon, were used. The cake used is stated to resemble a normal market product, and to be comparable with linseed cake used in England.

The following results were obtained from these feeding trials:—

Sheep:—A group of animals accustomed to trough feeding were used and the smallest admixture of Para seed cake in other concentrated food was detected by them and left uneaten, even when the total food supplied over a fortnight was reduced below the ration necessary for maintenance.

All attempts at feeding sheep with the cake failed.

Young Cattle. These ate the cake readily, but when the quantity was increased to 8 lbs. per head daily, scouring occurred and even 5 lbs. per day with 56 lbs. of mangold, produced slight laxative effects. Further experiments confirmed these results, and the cake should not therefore be fed in larger quantities than this latter amount.

The beef from two of these cattle, subsequently slaughtered, after having been fed with Para seed cake at the rate of 6 lbs. per day for ten weeks, was very favourably reported upon.

Dairy Cows:—Six barren cows were taken for this trial and were fed with increasing quantities of Para rubber seed cake up to 14 lbs. at the end of a week, this being the only concentrated food given. No change was observed in the excreta after continuing the trial for six days. The yield of milk rose, as the food was richer than that normally fed, but the percentage of milk fat was unchanged. Butter made from the milk was normal. The conclusion is drawn that dairy cows may be safely fed with Para seed cake.

Full grown fattening cattle:—The dairy cows used in the previous trial were fattened while in milk, the amount of Para seed cake fed being reduced from 14 lbs. to 8 lbs. with the addition of 4 lbs. of other cake.

The cows remained healthy and gave a high milk yield, till they were intentionally dried off a month before sale for slaughter. The increase per day in live weight over a period of nine weeks was 1.7 lbs. per cow.

From these experiments, the cake appears to be an excellent fattening food for cows, and its value as a cattle food has been proved.

The following is the chemical composition of the cake used in the two trials in comparison with linseed cake:—

	Para seed cake (abnormal sample)	Para seed cake (normal sample)	Linseed cake
Moisture	6.91	8.75	11.6
Crude proteins	29.93	30.19	29.5
Consisting of:—			
True proteins	27.03	24.85	
Other nitrogenous substances.	2.90	5.34	
Fat	17.68	8.71	9.50
Carbohydrates (Starch, etc.)	35 97	41.71	35.54
Fibre	4.82	5.01	9.10
Ash	4.69	5.60	5.20
Nutrient ratio		1:20	1:20
Food units		139	133.

The close agreement between the normal cake and Linseed cake is very marked. A small quantity of cyanogenetic glucoside was present, yielding approximately 0.02 per cent. Prussic acid, a negligible quantity.

Para Rubber Seed Kernels.

A sample of kernels from Ceylon yielded 45 per cent. of oil, on extraction with solvents.

A sample of the extracted oil was found to give a high "acid value," and this was seen to be the cause of the poor non-spreading qualities of paint prepared from it. A high "acid value" is given by oil from damaged or old kernels, which indicates the necessity of only using sound seeds. If seeds are decorticated in this country, as they should be for export, they should be well sun-dried, to prevent moulds, which are likely to break up the fat into free acids.

B. J. E.

ULU SELANGOR DISTRICT PLANTERS' ASSOCIATION.

A general meeting of this association was held at the Kuala Kubu Rest House at 9.30 a.m. on Sunday March 8th, 1914.

The following were present:—Mr. W. De L. Brooke Chairman, Mr. W. A. Henderson Hon. Sec., Messrs. R. M. Newton, G. E. Howard, E. G. Leggatt, R. P. Mackilligan, M. D. Fallon, and F. W. Davies.

The following business was discussed.

Minutes of the previous meeting were read and passed.

Chairman of the P. A. M. : Proposed by Mr. Newton seconded by Mr. Mackilligan that Mr. E. Macfadyen be the chairman for the P. A. M. for the year. Carried unanimously.

The Secretary read letters from the Controller of Labour with regard to sub-committees of the local associations being appointed to confer with the Controller in matters which come within the meaning of parts 8 and 9 of the Labour code. It was agreed to be a great advance that Planters, the community most concerned, be consulted in matters directly affecting their interests in different localities.

A letter was read from the Secretary of the P. A. M. asking for the views of the local association on paragraph 40 of the Labour code.

An interesting discussion followed in which various members spoke of instances where this provision of the Labour code did not bring within its ruling employers of labour who did nothing towards bringing labour into the country. Resolved that the Secretary write to the Controller of Labour for his interpretation of the law in so far as it affected employers of Indian labour not resident on the place of work.

Delegates: Proposed by Mr. W. De. L. Brooke seconded by Mr. E. G. Leggatt that the Chairman and Secretary be elected as delegates of the association to the P. A. M. Carried unanimously.

Election of Officers: Proposed by Mr. W. De. L. Brooke seconded by Mr. Howard that Mr. F. W. Davies be elected Hon. Secretary. Carried unanimously.

The following were elected by ballot as the committee in addition to the Hon. Secretary :—

Mr. M. D. Fallon (Chairman), Mr. F. W. Carey, Mr. G. E. Howard, Mr. N. W. Dakeyne, Mr. W. A. Henderson.

Sub-Committee: Proposed by Mr. Newton seconded by Mr. Fallon :—

That the incoming committee be the sub-committee to discuss any matters affecting labour with Controller of Labour.

The meeting closed with a vote of thanks to the retiring chairman.

DEPARTMENT NOTES.

Mr. L. C. Brown, Federal Inspector of Coconuts, Department of Agriculture, F.M.S., Kuala Lumpur, retired from the service on 31st January, 1914.

Mr. B. Bunting, Assistant Manager, Jin Seng Estate, has been appointed as Assistant Agriculturist, Department of Agriculture, F.M.S., Kuala Lumpur, and assumed his duties on the 10th March, 1914.

FEDERATED MALAY STATES.

Comparative Statement of Cultivated Rubber Exported, with Value and Duty Collected Thereon, during the Years 1914 and 1913.

Destination.	Exported during Jan. 1914.	Previously.	Total export during the year.	Export during similar period of previous year.	Increase.	Decrease.	Value of rubber exported, 1914.	Duty collected, 1914, to date.
	Tons.	Tons.	Tons.	Tons.	Tons	Tons.	$	$ c.
Straits Settlements ...	1,289.78	...	1,289.78	769.81	519. 97	...	2,097,920	52,157.88
United Kingdom ...	1,071.60	...	1,071.60	1,133.69	...	62.09	1,771,209	44,280.25
Continent of Europe ...	119.46	...	119.46	145.50	...	26.04	198,888	4,972.20
Ceylon	61.61	...	61.61	81.75	...	20.14	102,145	2,553.50
Other Countries ...	...	...	...	...	...	...	...	...
Total ...	2,542.45	...	2,542.45	2,130.75	519.97	108.27	4,170,162	103,963.83

KUALA LUMPUR,
6th February, 1914.

H. W. FIRMSTONE,
Acting Commissioner, Trade and Customs, F.M.S.

Abstract of Meteorological Readings in the various Districts of Malaya for the Month of January, 1914.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	TEMPERATURE.				HYGROMETER.				Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kelantan, Kota Bahru	...	144.	78.5	85.03	72.29	12.74	76.2	.857	74.6	.87%	...	14.29	6.95
Malacca, Durian Daun Hos.	29.921	156.	80.8	86.1	70.4	15.7	77.7	.933	...	.87	N.	5.19	0.62
N. Sembilan, Dist. Hospital Seremban	...	148.	78.9	90.4	70.9	19.5	75.2	.803	78.2	.81	N.	2.72	0.67
,, Dist. Hos. K. Pilah	...	152.1	78.8	86.8	73.0	13.8	77.2	.902	76.1	.91	...	6.54	1.00
,, ,, Tampin	...	...	79.3	...	...	...	74.7	.780	71.7	.78	...	3.59	0.80
,, ,, P. Dickson	...	153.1	80.4	86.7	73.5	13.2	76.6	.841	74.0	.81	...	4.84	0.85
Pahang, ,, K. Lipis	...	...	78.1	85.1	70.	15.1	74.2	...	...	...	...	12.02	2.60
Penang, ,, Penang	29.869	148.4	83.1	90.1	73.4	16.7	75.8	.808	70.2	72.6	...	1.37	1.02
Perak, ,, Taiping	...	106.	80.71	92.	69.	23.	76.50	.858	...	.82	...	13.75	3.73
,, ,, Ipoh	...	...	81.04	91.	69.	22.	75.83	.824	...	.78	...	7.84	1.54
,, ,, T. Anson	...	...	81.10	91.	69.	22.	76.56	.853	...	.80	...	15.70	2.00
,, ,, P. Buntar	...	...	80.70	90.	70.	20.	76.39	.851	...	.82	...	7.78	1.69
,, The Cottage	...	...	...	...	...	...	...	...	...	...	...	10.16	1.89
Selangor, General Hospital Kuala Lumpur	...	120.0	80.1	88.2	74.6	13.6	76.4	.839	73.9	.81	S.E.	3.39	1.35
,, Dist. Hos. Klang	...	...	76.9	86.9	70.6	16.3	75.2	...	...	...	...	9.81	1.72
,, ,, K. Selangor	...	...	...	89.9	73.2	16.7	...	...	...	...	...	6.48	1.40
,, ,, Rawang	...	...	...	91.3	71.2	20 1	...	...	...	...	...	3.04	0.85
Singapore, Kandang Kerbau Observatory	29.964	161.5	79.5	92.5	71.	21.5	76.1	.849	...	.85	N. E.	24.35	4.77